**3GPP TSG SA-WG2 Meeting #155  *S2-230xxxx***

**Athens, Greece, February 20 – 24, 2023 (*revision of*)**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **23.501** | **CR** |  | **rev** | **-** | **Current version:** | **18.0.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network | **x** |

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| ***Title:*** | Support for temporary network slice optimization | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | eNS\_ph3 | | | | |  | ***Date:*** | | | 2023-02-09 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-18 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | As concluded in TR23.700-41, AMF is configured with S-NSSAI availability policies that the AMF sends to the UE. Availability validity can be time and location. The UE uses the policies and when the availability are not valid, the UE considers the S-NSSAI to be 1) not registered or 2) registered while no UP are allowed to be activated based on information in the received policy.  The AMF enforcement of the S-NSSAI availability policies e.g. when the UE does not support the policies will be described during normative phase.  It is also related to graceful and gradual termination  - If the UE supports the handling of timing information indicating information on time of network slice availability, the network may provide the timing information to the UEs so the UE knows in advance when a network slice ceases to be supported. In this case, the UE can take the necessary actions to prepare for the slice not becoming available.  - In addition, the AMF, for non-supporting UEs and for the case of UE not performing any actions despite of the timing information provided by the network, may be triggered by the OAM to start gradually terminating PDU Session(s) associated with S-NSSAI subject to be terminated. The AMF releases PDU Session(s), associated with the S-NSSAI subject to be terminated, based on operator’s policy available at the AMF.  Whether graceful release can also be achieved for non-supporting UEs is left for normative phase. | | | | | | | | |
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| ***Summary of change:*** | | Add the description related to temporary network slice optimization as above. | | | | | | | | |
| ***--*** | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Temporary network slice optimization is not supported. | | | | | | | | |
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| ***Clauses affected:*** | | 5.15.1, 5.15.x(new), 5.4.4a | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR’s revision history:*** | |  | | | | | | | | |

## 

## **FIRST CHANGE**

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5.15.1 General

A Network Slice instance is defined within a PLMN or within an SNPN and shall include:

- the Core Network Control Plane and User Plane Network Functions, as described in clause 4.2,

and, in the serving PLMN, at least one of the following:

- the NG-RAN described in TS 38.300 [27];

- the N3IWF or TNGF functions to the non-3GPP Access Network described in clause 4.2.8.2 or the TWIF functions to the trusted WLAN in the case of support of N5CW devices described in clause 4.2.8.5;

- the W-AGF function to the Wireline Access Network described in clause 4.2.8.4.

The 5G System deployed in a PLMN shall always support the procedures, information and configurations specified to support Network Slice instance selection in the present document, TS 23.502 [3] and TS 23.503 [45].

Network slicing support for roaming is described in clause 5.15.6.

Network slices may differ for supported features and network functions optimisations, in which case such Network Slices may have e.g. different S-NSSAIs with different Slice/Service Types (see clause 5.15.2.1). The operator can deploy multiple Network Slices delivering exactly the same features but for different groups of UEs, e.g. as they deliver a different committed service and/or because they are dedicated to a customer, in which case such Network Slices may have e.g. different S-NSSAIs with the same Slice/Service Type but different Slice Differentiators (see clause 5.15.2.1).

The network may serve a single UE with one or more Network Slice instances simultaneously via a 5G-AN regardless of the access type(s) over which the UE is registered (i.e. 3GPP Access and/or N3GPP Access). The AMF instance serving the UE logically belongs to each of the Network Slice instances serving the UE, i.e. this AMF instance is common to the Network Slice instances serving a UE.

NOTE 1: Number of simultaneous connection of Network Slice instances per UE is limited by the number of S-NSSAIs in the Requested/Allowed NSSAI as described in clause 5.15.2.1.

NOTE 2: In this Release of the specification it is assumed that in any (home or visited) PLMN it is always possible to select an AMF that can serve any combination of S-NSSAIs that will be provided as an Allowed NSSAI.

The selection of the set of Network Slice instances for a UE is triggered by the first contacted AMF in a Registration procedure normally by interacting with the NSSF, and can lead to a change of AMF. This is further described in clause 5.15.5.

A PDU Session belongs to one and only one specific Network Slice instance per PLMN. Different Network Slice instances do not share a PDU Session, though different Network Slice instances may have slice-specific PDU Sessions using the same DNN.

During the Handover procedure the source AMF selects a target AMF by interacting with the NRF as specified in clause 6.3.5.

Network Slice-Specific Authentication and Authorization (NSSAA) enables Network Slice specific authentication as described in clause 5.15.10.

Network Slice Admission Control (NSAC) controls the number of registered UEs per network slice and the number of PDU Sessions per network slice as described in clause 5.15.11.

Support of subscription-based restrictions to simultaneous registration of network slices uses Network Slice Simultaneous Registration Group (NSSRG) information to enable control of which Network Slices that can be registered simultaneously by a UE as described in clause 5.15.12.

Support of data rate limitation per Network Slice for a UE enables enforcement of Maximum Bit Rate per Network Slice for a UE as described in clause 5.15.13.

The selection of N3IWF supporting a set of slice(s) is described in clause 6.3.6.

The Support of temporary network slice optimization is described in clause 5.15.x.

## **More CHANGEs**

### 5.15.x Support for temporary network slice optimization

A network slice may be available only for a limited time that is known at the network based on operator policy. This clause describes the optimization on handling temporary network slice.

The AMF and the SMF, based on configuration, may be configured with validity time window for an S-NSSAI. The AMF shall only set the S-NSSAI as Allowed NSSAI or Partially Allowed NSSAI when the time matches what is indicated in the validity time window. When the validity time window expires, the AMF shall remove the S-NSSAI from the Allowed NSSAI or Partially Allowed NSSAI, if available and the SMF, based on configuration, shall also release any PDU sessions associated of the S-NSSAI, if available.

For a supporting UE, the UE indicates its support for the temporary network slices optimization in the UE MM Core Network Capability as described in clause 5.4.4a in the Registration Request. The AMF, based on OAM configuration, may indicate to a supporting UE validity time window for some S-NSSAIs in the Configured NSSAI in a Registration Accept or in a UE Configuration Update.

When a supporting UE has received validity time window for an S-NSSAI, the UE shall only include the S-NSSAI in the Requested NSSAI or establish a PDU Session of the S-NSSAI when the time matches what is indicated in the validity time window. The UE shall locally remove the S-NSSAI from the Allowed NSSAI or Partially Allowed NSSAI, if available and the UE shall also locally release any PDU sessions associated of the S-NSSAI before the validity time window expires, if available.

For a non-supporting UE, the UE enforces URSP rule as described in clause 6.6.2.3 of TS 23.503 [45] to only establish PDU sessions associated of the S-NSSAI when the time matches what is indicated in the validity time window.

NOTE 1: Based on operator configuration in the PCF, each S-NSSAI can be associated with validity time window, which can be used by the PCF to generate Time Window of the URSP rule. The Time Window of the URSP rule with the corresponding S-NSSAI is within validity time window of such S-NSSAI. Then, the non-supporting UE will only establish PDU Sessions associated of the S-NSSAI when the time matches what is indicated in the validity time window.

## **MORE CHANGES**

### 5.4.4a UE MM Core Network Capability handling

The UE MM Core Network Capability is split into the S1 UE network capability (mostly for E-UTRAN access related core network parameters) and the UE 5GMM Core Network Capability (mostly to include other UE capabilities related to 5GCN or interworking with EPS) as defined in TS 24.501 [47] and contains non radio-related capabilities, e.g. the NAS security algorithms, etc. The S1 UE network capability is transferred between all CN nodes at AMF to AMF, AMF to MME, MME to MME, and MME to AMF changes. The UE 5GMM Core Network Capability is transferred only at AMF to AMF changes.

In order to ensure that the UE MM Core Network Capability information stored in the AMF is up to date (e.g. to handle the situation when the USIM is moved into a different device while out of coverage, and the old device did not send the Detach message; and the cases of inter-RAT Registration Area Update), the UE shall send the UE MM Core Network Capability information to the AMF during the Initial Registration and Mobility Registration Update procedure within the NAS message.

The AMF shall store always the latest UE MM Core Network Capability received from the UE. Any UE MM Core Network Capability that an AMF receives from an old AMF/MME is replaced when the UE provides the UE MM Core Network Capability with Registration signalling.

If the UE's UE MM Core Network Capability information changes (in either CM-CONNECTED or in CM-IDLE state), the UE shall perform a Mobility Registration Update procedure when it next returns to NG-RAN coverage. See clause 4.2.2 of TS 23.502 [3].

The UE shall indicate in the UE 5GMM Core Network Capability if the UE supports:

- Attach in EPC with Request type "Handover" in PDN CONNECTIVITY Request message (clause 5.3.2.1 of TS 23.401 [26]).

- EPC NAS.

- SMS over NAS.

- LCS.

- 5G SRVCC from NG-RAN to UTRAN, as specified in TS 23.216 [88].

- Radio Capabilities Signalling optimisation (RACS).

- Network Slice-Specific Authentication and Authorization.

- Parameters in Supported Network Behaviour for 5G CIoT as described in clause 5.31.2.

- Receiving WUS Assistance Information (E-UTRA) see clause 5.4.9..

- Paging Subgrouping Support Indication (NR) see clause 5.4.12.

- CAG, see clause 5.30.3.3.

- Subscription-based restrictions to simultaneous registration of network slices (see clause 5.15.12).

- Support of NSAG (see clause 5.15.14).

- Minimization of Service Interruption (MINT), as described in clause 5.40.

- Equivalent SNPNs (see clause 5.30.2.11).

- Unavailability Period, as described in clause 5.4.1.4.

- Support temporary network slices optimization (see clause 5.15.x)

If a UE operating two or more USIMs, supports and intends to use one or more Multi-USIM features (see clause 5.38) in a PLMN for a USIM, it shall indicate in the UE 5GMM Core Network Capability for this USIM in this PLMN that it supports these one or more Multi-USIM features with the following indications:

- Connection Release Supported.

- Paging Cause Indication for Voice Service Supported.

- Reject Paging Request Supported.

- Paging Restriction Supported.

Otherwise, the UE with the capabilities of Multi-USIM features but does not intend to use them shall not indicate support of these one or more Multi-USIM features.

A UE not operating two or more USIMs shall indicate the Multi-USIM features are not supported.

NOTE: It is not necessary for a UE operating two or more USIMs to use Multi-USIM features with all USIMs.

## **END of CHANGES**